

REMARKS

The preliminary amendment of July 10, 2003 has been entered into record. Claims 11-13 and 15-24 are pending and have been examined on the merits. Without acquiescence in any rejection, claims 11-13 and 15-24 have been amended according to the present amendment in order to more particularly point out and distinctly claim the subject matter encompassed by certain embodiments. Support for the amendments submitted herewith may be found in the specification, for example, at page 7, lines 9-11; page 15, lines 20-21; page 15, lines 14-16; and elsewhere. No new matter has been added.

REJECTIONS UNDER 35 USC §§ 102 AND 103

Claims 11-13 and 15-24 stand rejected for alleged lack of novelty under 35 U.S.C. § 102(b) in view of Moorhouse (*Industrial Polysaccharides: Genetic Engineering, Structure/Property Relations and Applications*, M. Yalpani, ed., Elsevier, 1987, pages 187-206), or Kang et al. (U.S. Patent No. 3,915,800), or Pollock et al. (U.S. Patent No. 5,854,034). In the alternative, the PTO has rejected claims 11-13 and 15-24 under 35 U.S.C. § 103(a) for alleged obviousness over Moorhouse, Kang et al. or Pollock et al.

More specifically, the PTO asserts that the cited references disclose purified polysaccharides having apparent structures that are the same as the structures of the exopolysaccharides encompassed by the currently pending product-by-process claims. The PTO asserts further that the cited references describe polysaccharides that are “outwardly identical” to, or that otherwise render obvious, the presently claimed “slime form” polysaccharides.

Applicants respectfully traverse these grounds for rejection. It is axiomatic that for a *prima facie* case of anticipation under § 102, the PTO must establish that each and every feature of the claim can be found in a single cited document from the prior art. For reasons given herein, the PTO fails to establish *prima facie* anticipation under § 102, and also fails to establish a *prima facie* case of obviousness under 35 USC § 103(a). (See *In re Mayne*, 104 F.3d 133, 1341-43, 41 U.S.P.Q.2d 1451 (Fed. Cir. 1997) (PTO has the burden of showing a *prima facie* case of obviousness.)). The PTO must show (1) that the cited reference(s) teaches or suggests all claim elements; (2) that the reference provides some teaching, suggestion, or motivation to

combine or modify the teachings of the prior art to produce the claimed invention; and (3) that according to the teachings of the reference, a person having ordinary skill in the art will achieve the claimed invention with a reasonable expectation of success.

The presently claimed embodiments are directed in pertinent part to a fermentation broth comprising slime-forming *Sphingomonas* bacterial cells and an exopolysaccharide in a slime form, wherein the exopolysaccharide can be recovered from the fermentation broth by alcohol precipitation at a temperature of about 25°C to about 50°C to yield at least about 10 grams of exopolysaccharide per liter of broth. According to certain embodiments the fermentation broth comprises an exopolysaccharide in slime form that has a specified structural formula as described in the specification and recited in the claims; the presently claimed fermentation broth may in certain embodiments have at least about 1% w/v exopolysaccharide and a viscosity of not more than about 25,000 cp. Related embodiments include a fermentation broth wherein the *Sphingomonas* is selected from ATCC PTA-3487, ATCC PTA-3486, ATCC PTA-3485, ATCC PTA-3488, and mixtures thereof.

The presently claimed subject matter can be readily distinguished over the prior art by providing a fermentation broth from which a sphingan exopolysaccharide product of slime-forming *Sphingomonas* bacterial cells can be recovered using alcohol precipitation at a temperature of about 25°C to about 50°C to yield at least about 10 grams of exopolysaccharide per liter of broth (*e.g.*, specification at page 7, lines 9-11; at page 11, lines 11-17). The instant subject matter is thereby contrasted with prior art fermentation broths made using “capsule form” bacterial cells, which contain capsular exopolysaccharide that is still attached to cells (*e.g.*, page 2, line 35 through page 3, line 9), and which require chemical and/or physical steps to separate cells from the exopolysaccharide capsule such as heating to high temperature or acid hydrolysis (*e.g.*, page 3, lines 15-16 and 28-36) prior to exopolysaccharide recovery by alcohol precipitation (*e.g.*, page 7, lines 9-11 and 25-36). Contrary to assertions found in the Action, exopolysaccharides that are subjected to high temperature and acid hydrolysis undergo at least partial chemical degradation, such that a person skilled in the art would not understand the components of a fermentation broth that has avoided high temperature and acid hydrolysis to be

identical with those of a fermentation broth that has been subjected to such degradative processing steps.

In addition, the instant embodiments offer unprecedented advantages associated with a fermentation broth having an exopolysaccharide in slime form that can be recovered from the broth by alcohol precipitation at a temperature of about 25°C to about 50°C as a result of the fermentation broth having reduced viscosity relative to that of prior art fermentation broths for exopolysaccharide production (*e.g.*, page 5, line 20 through page 6, line 2; page 6, line 35 through page 7, line 11). The instant embodiments still further provide a fermentation broth in which higher concentrations of dissolved oxygen can be beneficially maintained (*e.g.*, page 5, line 36 through page 6, line 21) relative to fermentation broths comprising non-slime forming (*e.g.*, capsular) bacterial strains. These features are neither taught nor suggested by the cited prior art documents. Hence, the PTO therefore fails to establish a *prima facie* case of anticipation and also fails to establish a *prima facie* case of obviousness of the presently claimed subject matter.

None of the cited documents, alone or in combination, teaches the presently claimed fermentation broth. In this regard, none of the cited documents teaches or suggests a fermentation broth comprising a *Sphingomonas* bacterial cell, much less a cell of any of the recited mutant *Sphingomonas* strains. Further on this point, the documents cited by the PTO fail to teach or suggest a fermentation broth comprising slime-forming mutant *Sphingomonas* cells and an exopolysaccharide in slime form. As disclosed in the instant specification (*e.g.*, at page 11, lines 9-25), slime-forming bacteria are readily distinguishable from non-slime-forming bacteria (*i.e.*, “capsular” cells), and a “slime” form of bacterial exopolysaccharide can be substantially separated from cells in a fermentation broth in the absence of heat treatment (*e.g.*, specification at page 11, lines 15-16). Contrary to the assertions found in the Office Action, “slime” therefore refers to a condition of a fermentation broth and is not simply any mixture of dead bacterial cells and a saccharide polymer. Accordingly, the cited documents fail to teach or even remotely suggest a fermentation broth comprising the recited slime-forming *Sphingomonas* bacterial cells and an exopolysaccharide in slime form having at least about 1% slime form sphingan exopolysaccharide and a viscosity of not more than about 25,000 cp, or from which at

least about 10 grams of sphingan exopolysaccharide per liter of broth can be recovered by alcohol precipitation at about 25°C to about 50°C.

The deficiencies of the documents cited by the PTO are not remedied by combining them. Kang et al. merely describe an unusual *Azotobacter* bacterial strain that was isolated and characterized as described therein, including description of exopolysaccharide products of the *Azotobacter* strain and comparison of the *Azotobacter* bacterial strain to several other bacterial species. Kang et al. fail, however, even remotely to suggest the presently claimed fermentation broth containing slime-forming *Sphingomonas* bacterial cells. From amongst the myriad possible bacterial species that a person having ordinary skill in the art could select for preparing a fermentation broth, there is absolutely no teaching or suggestion in Kang et al. to select, with a reasonable expectation of successfully arriving at the presently claimed subject matter, a slime-forming *Sphingomonas* according to the instant claims. Based on Kang et al., such a skilled person could not reasonably expect to obtain a fermentation broth containing a slime-forming *Sphingomonas* and from which exopolysaccharide can be alcohol precipitated at moderate temperatures to yield at least about 10 grams of sphingan exopolysaccharide per liter of broth, absent the teachings of the present application.

The disclosure of Pollock et al. relates to DNA segments isolated from *Sphingomonas* bacteria containing genes that encode gene products which enhance sphingan polysaccharide production when the DNA segments are introduced into other bacterial host cells, including *Sphingomonas* host cells, by recombinant genetic engineering techniques. Pollock et al. are silent, however, with respect to a fermentation broth comprising slime-forming *Sphingomonas* bacterial cells and an exopolysaccharide in a slime form. Moreover, none of the slime-forming mutant *Sphingomonas* strains that are disclosed in the present application are disclosed or even contemplated by Pollock et al. Pollock fails to suggest applying any methodologies found in Kang et al. to any *Sphingomonas* bacterial strain, and certainly fails to suggest applying the methods of Kang to any of the *Sphingomonas* strains recited in the instant claims, such as slime-forming *Sphingomonas* cells or mutant *Sphingomonas* cells.

Pollock et al. similarly are thus silent with regard to a fermentation broth from which a sphingan exopolysaccharide product of slime-forming bacterial cells can be recovered

using alcohol precipitation at a temperature of about 25°C to about 50°C to yield at least about 10 grams of exopolysaccharide per liter of broth, or a fermentation broth comprising the presently recited slime-forming *Sphingomonas* bacterial cells and an exopolysaccharide in slime form having at least about 1% slime form sphingan exopolysaccharide and a viscosity of not more than about 25,000 cp. Instead, the focus of Pollock et al. is on recombinant techniques to enhance sphingan exopolysaccharide production according to standard fermentation technologies described therein, without apparent recognition of the *desirability* of screening for and selecting slime-forming *Sphingomonas* bacteria for use in a fermentation broth according to the present claims. The mere fact that a person having ordinary skill in the art is *capable* of combining or modifying the teachings of the prior art does not make the resultant combination *prima facie* obvious, as the prior art must also suggest the *desirability* of the combination (*see, e.g., In re Mills*, 16 USPQ2d 1430, Fed. Cir. 1990; *In re Fritch*, 23 USPQ2d 1780, Fed. Cir. 1992).

Given Pollock et al., alone or in combination with the other cited documents, the person having ordinary skill in the art therefore would not have been motivated to arrive at the presently claimed fermentation broth with the requisite reasonable expectation of success.

Moorhouse fails to remedy the deficiencies of Kang et al. and Pollock et al. Moorhouse merely reviews the physicochemical properties of, and industrial uses for, a number of structurally related microbial polysaccharides, including gellan, welan, rhamsan, S-88 and others. Moorhouse is silent with respect to a fermentation broth comprising a slime-forming *Sphingomonas* bacterial cell or a broth from which exopolysaccharide can be recovered by alcohol precipitation. Moorhouse thus fails in any way to suggest a fermentation broth such as that presently claimed, nor does Moorhouse in any way contemplate any advantages associated with the presently claimed subject matter.

Finally and with regard to product-by-process claims, Applicants note that claims of varying scope may be presented even if it is necessary to describe the claimed product in product-by-process terms. *Ex parte Pantzer*, 176 USPQ 141 (Bd. App. 1972) See M.P.E.P. 2173.05(p). As presented herein, the presently amended claims are directed to embodiments of varying scope, including the subject fermentation broth that is obtained as a product of the

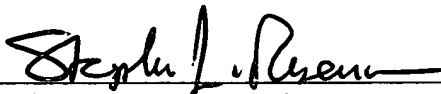
process recited in claim 11. Accordingly, the subject matter encompassed by such claims is proper and, for reasons given above, satisfies the requirements for novelty and non-obviousness.

In view of the foregoing, including the amendments submitted herewith, Applicants submit that the rejections asserted by the PTO have been overcome and their withdrawal is respectfully requested.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,
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